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1912

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THE STANFORD EXPEDITION TO
BRAZIL, 1911.

J. C. BRANNER, *Director.*

PARABIOSIS IN BRAZILIAN ANTS.

By WILLIAM M. MANN.

[Reprinted from PSYCHE, Vol. XIX, No. 2.]

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During the different visits of the members of the Stanford Expedition at Pará, the suburb Souza was found to be the best collecting ground, and much of their time was spent there. The combination of forest and good trails, quickly reached by electric cars, made the locality quite ideal for collectors having only a limited time at their disposal.

Here, as elsewhere in Brazil, ants abounded, and of these the small, black *Dolichoderus bispinosus* Oliv. was most in evidence. This species lives in carton nests, built on the branches of trees, though often a colony is found in a deserted termitarium. After a couple of attempts I gave up investigating the larger nests, for when these were disturbed myriads of ants swarmed out, literally tumbling over one another to the ground, where they scattered in all directions in search of the disturber. On hurriedly leaving the vicinity of one nest, I happened to leave my net lying on the ground. On my return, a few minutes later, it was covered with ants, each gripping so tightly that when I pulled it away its head often remained attached to the net. In young trees along the trails there were numerous small nests, four or five inches in diameter, and several of these were opened. Each contained, besides the *Dolichoderus*, a colony of a small black *Cremastogaster*. The smaller ants were not scattered throughout the nest, but were grouped in certain of the chambers.

Forel² has recorded observations which he made in Columbia

¹ Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 54.

² La Parabiose chez les Fourmis. Bull. Soc. Vaud. Sc. Nat. XXXIV, 130, p. 380-385.

on the association of ants belonging to the same genera. The colonies which he examined contained larvæ, and these were grouped separately in different parts of the nest. To this association, where colonies of different species live in the same nest, but in different chambers, and have no other relations with each other, each species foraging for itself, Forel has given the name "parabiosis." In the case of *Dolichoderus* and *Cremastogaster*, it would seem that all the advantage must be on the side of the latter, since it shares the nest built by the other and is well protected, without apparently contributing anything in return.

Among the observed species of *Dolichoderus*, *bispinosus* was the only one capable of being at all offensive to man. One species, *D. lugens* Emery, which was common on the upper Rio Madeira, attempts to defend itself by secreting from the anus a large drop of yellow, oily substance, but this has no effect on the human skin. *Dolichoderus debilis* var. *rufescens* hereafter described, attempts to defend its nest, but because of the small size and feeble mandibles, it is scarcely capable of repelling a large intruder.

In August, while collecting along a trail near Camp No. 41 on the Madeira-Mamoré Railroad in the State of Matto Grosso, my attention was attracted to a number of small red *Dolichoderus*. They were moving excitedly about, holding the abdomen up and a little to one side, so that they had a comically asymmetrical appearance. A tree by the trail had been felled, and in a fork of its branches, at what had been a height of approximately forty feet, I found the nest, an earthy structure, ovate in form, about a foot in length and eight inches in diameter. Fine roots of a plant ramified through this nest in all directions in such a manner as to make it quite firm, despite the nature of its component material. When I dug into the structure, numbers of the *Dolichoderus* rushed out. While collecting these I had a momentary glimpse of another ant, colored similarly to the *Dolichoderus*, but much larger, and with long legs. It emerged from one chamber and immediately disappeared into another. Hoping to collect this, as well as all phases of the *Dolichoderus*, I brought to the place a large quinine can, containing a piece of cotton saturated with chloroform, and began to dig and throw into this fragments of the nest. Hereupon numbers of the large ants rushed out, and my hand was severely stung before I realized that two colonies of ants,

one of them a stinging form, were occupying the nest. On examination, the fragments thrown into the can were seen to contain large numbers of both species, together with many larvæ and pupæ of each. The larger ant proved to be a Ponerine, of the genus *Odontomachus*. Males and females of *Dolichoderus* were also found, but there was none of these phases of the other. But the presence of many larvæ in all stages showed that the sexual forms of both species must have been present. During the two days following I revisited the nest frequently, and stirred it up. Each time both species of ant sallied out. Touching the nest lightly would bring out *Dolichoderus*, but it required a more vigorous prod to excite the other. My first examination had so disarranged the nest that I could make no close study of its structure, but was able to ascertain definitely that the *Odontomachus* were gathered together in its deeper recesses, while the smaller species occupied the peripheral chambers and galleries. No other nest was found, nor did I again find either of the ants. This may be readily explained by the usual inaccessibility of tree tops to the collector, so failure to find more in no wise proves that the species are uncommon.

It is unfortunate that only one nest was found as this leaves some doubt as to whether the two species are normally parobiotic. *Odontomachus* is, as Wheeler's observations have shown,¹ entomophagus in habit. Mr. C. T. Brues tells me that in Grenada, B. W. I., he found numerous colonies of a closely related ant, *Anochetus emarginatus* Fabr., living in the nests of termites which form their chief food. In this case the ant lives in a small part of the nest constructed by the termites. This association is, of course, not in any sense parobiotic, and there is a possibility that the Brazilian *Odontomachus* may have been feeding on the *Dolichoderus* larvæ. But it seems hardly probable that the latter would remain in the same nest with a colony of ants which were destroying its young. That they had been associated for some time is shown by the presence of all stages of the immature forms of both species. *Odontomachus* is normally ground-inhabiting, nesting beneath stones or in rotten logs, but it is not surprising that a

¹Biol. Bull. II, 1900.

species should have become arboreal in a region where so many animals have taken up this habit.

I admit that the finding of one example is not conclusive evidence of regular parabiotic association, but the observations here recorded seem to indicate a much closer relation than that of *Dolichoderus* and *Cremastogaster*, for it is evident that both species would derive benefit from the association. In the earthy, arboreal nest of *Dolichoderus*, *Odontomachus* finds a condition similar to that of the ordinary nesting place of the genus, while to the other, a feeble species, the advantage in having a colony of powerful stinging ants in the same nest is obvious, provided of course that it, itself, is not molested. For the reasons stated above, I do not believe that such molestation occurs.

The difference in the stimulus necessary to bring each species out of the nest is interesting. *Dolichoderus* sallied out at a slight disturbance, *Odontomachus* not until the nest was more thoroughly jarred and prodded. Ordinarily the smaller ant would be able to combat a feeble enemy, while one capable of seriously disarranging the nest would excite the more powerful nest-mate. This difference of habit was observed a number of times in the same nest.

As both of the forms of *Dolichoderus* and *Odontomachus* are new to science, I append a description of the worker of the latter and of all the phases of the former.

***Odontomachus affinis* Guérin, subsp. *mayi* subsp. nov. ✓✓**

Worker. Length 9.5 mm. Head, excluding mandibles, $1\frac{1}{2}$ times as long as broad. Mandibles $\frac{2}{3}$ length of head; inner edge with twelve fine teeth; apex with three large teeth, the most apical long and pointed, the most basal nearly as long, but sharply truncate; between these, closest to the most apical and one half as long as this is a smaller tooth. Thorax as in *affinis*, but sculpture on pronotum is longitudinally oblique. Petiolar node short and thick, spine slender, acuminate.

Head shining, finely punctate. Thorax opaque; pronotal sculpture strong, centric, on disc longitudinally oblique, diverging from the median impression. Abdomen smooth, shining.

Head with fine short, recumbent pubescence; vertex in front with two long hairs. Pronotum above with several long erect hairs. Abdomen with erect pile and recumbent pubescence. Coxæ and base of posterior border of femora with long hairs. Legs finely pubescent. Pubescence and pile pale yellow in color.

Color rufo-testaceous, the apex of the abdomen in some specimens is slightly darker. Mandibles fuscous.

Described from numerous specimens taken at Madeira Mamoré Railroad Company Camp, No. 41, 306 kilometers from San Antonio, State of Matto Grosso, nesting with *Dolichoderus* as described above.

The typical *affinis* differs from *mayi* in its larger size (length 12 mm.), coarser sculpture, which is transverse on disc of pronotum; absence of long hairs on the epinotum and on vertex, and black abdomen. Var. *mayi* is intermediate between the typical *affinis* and the small Central American variety *panamaënsis* Forel.

Named after Mr. May, senior member of the firm now building the Madeira Mamoré Railroad Company.

✓✓ *Dolichoderus (Monacia) debilis* var. *rufescens*, var. nov.

Worker. Length $3\frac{1}{2}$ mm. Head excluding mandibles, behind nearly as broad as long, subcordate; eyes small, convex, a little posterior to middle of head; clypeus convex, anterior margin straight; mandibles short and thick; antennæ long, scape extending $\frac{2}{3}$ its length past occiput; funicular joints sub-equal, except apical, which is $1\frac{1}{2}$ times the length of preceding joint. Pronotum convex, broader than long, sides rounded without margin; spines short, acuminate, directed forward and outward, the distance between tips as great as width of head at base. Mesonotum convex; meso-epinotal impression very pronounced. Epinotum with sub-equal base and declivity; base feebly convex, seen from above rectangular, somewhat longer than broad, its lateral and especially its posterior borders strongly marginate; declivity arcuately excavated. Petiole broad, lamelliform, compressed anteriorly, its anterior surface flattened below and convex above, its apex with a minute tooth. Gaster broadly elliptical, about the length of thorax. Legs rather long.

Head and thorax sub-opaque with coarse shallow punctures, which are less numerous on the front of the former, and finer and more indistinct on the pronotum. Pleuræ longitudinally regulose. Mandibles rather shining, sparsely punctate. Petiole and gaster shining, very finely striolate and sparsely and finely punctate.

Hairs pale yellow, suberect on the gaster, clypeus and thoracic dorsum, fine and oblique on the antennæ and legs.

Color ferruginous red, mandibular teeth black, tibiae slightly infuscated.

Female. Length 5 mm. Resembling the worker. Ocelli small. Pronotum $3\frac{1}{2}$ times as broad as its length at middle, without spines. Mesonotum convex in front, more flattened behind. Epinotum rounded, without trace of margin, its base convex, about half as long as the concave declivity. Petiole as in worker. Gaster more elongate.

Sculpture similar to that of the worker, but the punctuation of the head and thorax is somewhat coarser.

Wings. Length 5 mm. Infuscated; veins fuscous, except sub costa, which is piceous; stigma piceous.

Male. Length 3 mm. Head, excluding mandibles, broader than long, margin of occiput slightly concave; mandibles well developed, toothless; clypeus slightly convex, anterior border slightly acuminate; eyes very large and convex; ocelli large; cheeks short; antennæ long, extending to second abdominal segment; scape short, barely extending to occiput; first funicular joint as broad as long, second three times length of first, joints 3–11 sub-equal, each about twice the length of first; terminal $1\frac{1}{2}$ as long as the preceding joint. Pronotum small, with convex sides. Mesonotum broad. Epinotum rounded above, with small tubercle at base of declivity. Petiole short; node thickened, short, rounded in front, nearly flat behind. Gaster short, much broader than deep. Legs slender.

Head and thorax opaque, coarsely punctate. Gaster shining. Head and thorax with abundant, erect fuscous pile. Gaster with semi-erect white pile. Antennæ with fine white pubescence.

Color black, except tarsal joints, which are fuscous. Genitalia yellow. Wings slightly infuscated, veins fuscous.